

## AUSTRALITES FROM THE NORTHERN TANAMI OF THE NORTHERN TERRITORY.

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### ABSTRACT

A sample of five tektites (australites) from the northern Tanami Desert of the Northern Territory contributes to the definition of the strewn field in northern Australia. Two tektites are of the HMg (high magnesium) type, while three are of 'normal' composition. The sample lies on the projected depositional streak of HCa (high calcium) australites, but the absence of any specimens of HCa composition suggests that, unlike the HMg and 'normal' depositional areas, the HCa area does not extend into the northern part of the continent.

KEYWORDS: Tektites, australites, chemical composition, Tanami Desert, Northern Territory, Balgo, Western Australia, artefacts.

### INTRODUCTION

Tektite glass produced by meteorite impacts occur in restricted geographical areas known as strewn fields. Tektites from Australia (australites) may be genetically related to those of South-east Asia. The Southeast Asian tektites (philippinites, indochinites etc.) and australites are chemically quite similar (though not homogenous), consistently yield radioisotopic ages of formation of about 700-800,000 years before present, and show a directional gradient in average size and development of aerodynamic shapes. The Muong Nong (Indochina) type are layered, extremely irregular in size (up to several kilograms) and shape, and have no aerodynamic modifications. Australites are much smaller (rarely over 100 g) with unweathered examples noted for their well-developed aerodynamic symmetries and surface features. A number of possible impact sites have been identified in Indochina and as distant from Australia as central Asia (Kazakhstan) and Antarctica, some more likely than others, but the source of Australasian tektites has yet to be firmly established (Hartung and Koeberl 1994).

Determination of the extent of the australite strewn field is complicated by a range of factors which have resulted in tektite redistribution. Amongst them are erosional processes, transport by ground-dwelling birds who select them as gizzard stones, and transport by Aborigines who used them as both a raw material for stone tool making and for ritual purposes, and who transported them across the continent (e.g. Cleverly 1976; Edwards 1966; Akerman 1975; Gould 1969).

The rarity of tektites in northern Australia and the often inadequate documentation of their occurrence meant that for a long time there were insufficient grounds for assuming that the strewn field extended north of about latitude 25°S (Fig. 1) (Cleverly and Dortch 1975; Chalmers *et al.* 1976). The discovery of tektites in Pleistocene stream gravels of the far north (Bow River and King George River), in stratigraphic settings containing no supporting evidence for a human involvement in their presence, eliminated residual uncertainties about the extent of the field (Mason 1986; Fudali *et al.* 1991).

Australian tektites are not a chemically homogenous group, but fall into a number of

compositional classes which are confined to geographic regions (Taylor 1962; Taylor and Sachs 1964; Chapman and Schreiber 1969; Chapman 1971; Mason 1979, 1986, 1990). The cause or causes of this partitioning are not understood. Here we report on six tektite specimens, five from the northern Tanami Desert in the Northern Territory and one from near Balgo in Western Australia, for which we can provide an account of their recovery. These few specimens have a significance beyond their numbers because they come from an area remote from the nearest previously analysed collections (Fig. 1) and the sample contributes to the further definition of compositional regions.

Tektites were first reported from the Tanami by Jensen (1915) who reported that: "Mr William Laurie informs me that obsidian buttons are common about Bullock's Head - about 40 miles from Tanami on the Granite road." Cleverly

(1976) doubted the report because it was "... hearsay unsupported by specimens and no confirmation has been forthcoming in the 60 years since the report was made." In 1992 and 1993, Mr Phil Smith of the Western Mining Corporation discovered two tektites in the Tanami in the course of mineral exploration, and showed them to Mr J. Emerson of Kalgoorlie, the Chief Driller. Mr Emerson borrowed them for inspection by Mr W.H. Cleverly, who immediately appreciated their significance. Mr Smith kindly donated them to the Northern Territory Museum (NTM), where they are now lodged. A subsequent search in July, 1995, on Tanami Downs by an NTM party led to the recovery of three additional specimens from Bullock Head Lake. ('Bullock Head' appears to be the name applied to a general area, as well as figuring in the name of specific geographic features). The sixth specimen, from Jidirr near Balgo, West-

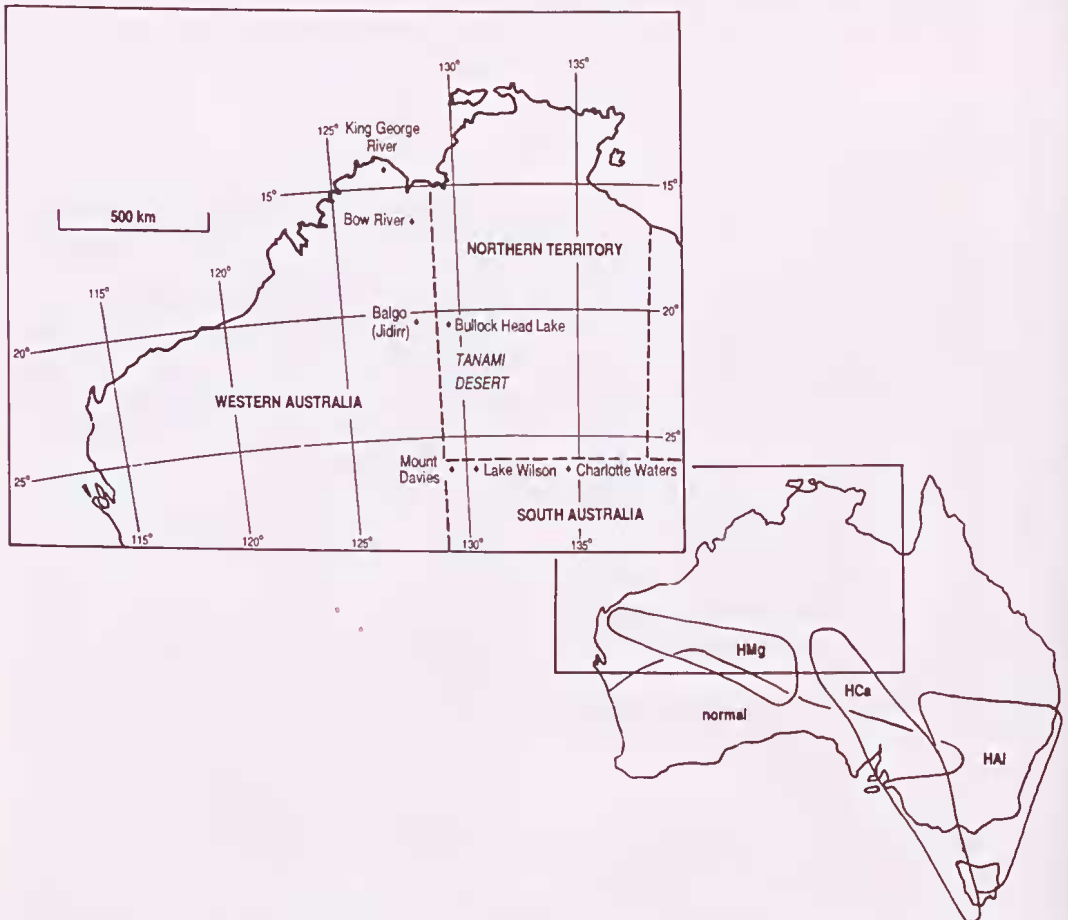


Fig. 1. Map showing localities mentioned in the text and the distribution pattern of HMc, HCa, HAI and 'normal' compositional classes of australite recorded by Chapman and Schreiber (1969) and Chapman (1971). The shown distributions give an impression of the extent of the australite strewnfield as it was generally accepted before the Bow and King George River finds. Note that 'normal' australites are a distinct class that has a restricted distribution within the strewnfield. (Distribution pattern after Chapman 1971: fig. 2).

ern Australia, was found in 1981 and presented to Mr K. Akerman who was accompanying its Aboriginal finder, Mr Richard Tax. The specimen is included here because Mason (1986) found no tektites in the Balgo area, and understood that they were not known by the Aboriginal inhabitants to occur there. Additional details are given below.

**Materials and methods.** Northern Territory Museum (NTM) 951 – Tanami Desert, Northern Territory, 20°25'S 129°46'E, coll. P. Smith, September 1992, round core, coarsely pitted followed by abrasion, diameter 18.2-20.2 mm, thickness 11.5 mm, 5.35 g, found in interdune area, on small (200 m diameter) claypan, sparsely covered by lateritic pebbles, no associated artefacts (P. Smith pers. comm., 13 November 1995). 952 – Tanami Desert, Northern Territory, 19°51'S 129°21'E, coll. P. Smith, October 1993, round core, coarsely pitted followed by abrasion, diameter 16.3 - 17.8 mm, thickness 9.7 mm, 3.30 g, found on lateritic pebble surface in area of first order streams, no associated artefacts (P. Smith pers. comm., 13 November 1995). 953 – Bullock Head Lake, Tanami Downs, Northern Territory, 20°25'S 129°11'E, coll. D. Megirian, 27 July 1995, irregular core, some coarse pits remaining after heavy abrasion and wind facetting, diameter 18.2 - 19.7 mm, thickness 11.4 mm, 5.28 g, found on pediment of lateritic pebbles, no associated stone artefacts. 954 – Bullock Head Lake, Tanami Downs, Northern Territory, 20°26'S 129°13'E, coll. D. Megirian, 27 July 1995, core, coarsely pitted followed by abrasion, diameter 13.2 - 14.5 mm,

thickness 8.0 mm, 1.70 g, found on pediment of lateritic pebbles, no associated stone artefacts. AA 95.9 – Bullock Head Lake, Tanami Downs, Northern Territory, 20°26'S 129°13'E, coll. P. Marianelli, 27 July 1995, tektite artefact (determination: K. Akerman), found on pediment of lateritic pebbles about 50 m southeast of 954. A scatter of artefacts was found at the base of a sand dune a further 50 m to the southeast, but the tektite artefact was not obviously part of this scatter. 9515 – Jidurr, Western Australia, 20°10'S 126°53'E, coll. R. Tax, 25 June 1981, round core, coarsely pitted followed by abrasion, diameter 15.0 mm, thickness 9.1 mm, mass 2.20 g, found amongst stone artefacts on sand dune (K. Akerman, field notes, 25 June 1981).

The australites were analysed by microprobe using the technique and standards of Mason (1979), and the results are given in Table 1. The artefact AA95.9 has the same specific gravity and refractive index as 951, 952 and 9515 and was therefore not analysed by microscope.

## DISCUSSION AND CONCLUSIONS

Chemical analysis (Table 1) shows that two of the Tanami tektites, 953 and 954 (the two specimens from Bullock Head Lake), plot with Chapman's (1971) HMg (high magnesium) group (Fig. 2), compositionally matching those from Mt Davies and Lake Wilson (Mason 1979). Chapman and Schreiber (1969) recorded the HMg group as occupying central Western Australia and adjacent areas in South Australia and the Northern Territory (Fig. 1), but the compositional region has since been extended into northern Western Australia to include Kimberley finds (Mason 1986, 1990; Fudali *et al.* 1991). The other tektites (951, 952 and 9515) are, in Chapman's classification, 'normal' australites, a chemically quite homogenous class with a confined distribution. (Mason (1979) found that none of the 'normal' australites he analysed contain more than 2.40 % MgO, and we observe that if this threshold is applied, then all the australites reported here fall into the HMg class.)

The Tanami finds lie on the projection of the streak of HCa (high calcium) tektites which extends from western Tasmania through to Charlotte Waters in northern South Australia. No HCa samples are present in the Tanami assemblage, suggesting that this class does not extend northwards much beyond Charlotte Waters.

Table 1. Analyses of australites from the Tanami of the Northern Territory (951-954 incl. and AA 95.9), and Jidurr, Western Australia (9515). Abbreviations: R.I., refractive index; S.G., specific gravity; - , not determined.

	951	952	953	954	9515	AA 95.9
SiO <sub>2</sub>	70.4	70.7	69.9	71.9	70.2	-
Al <sub>2</sub> O <sub>3</sub>	13.1	13.3	12.4	11.9	13.8	-
FeO	5.00	4.95	6.33	5.27	4.94	-
MgO	2.96	2.90	4.10	3.15	2.63	-
CaO	4.01	3.69	2.99	2.98	3.05	-
K <sub>2</sub> O	2.05	2.08	2.04	2.29	2.45	-
Na <sub>2</sub> O	1.14	1.23	1.15	1.15	1.46	-
TiO <sub>2</sub>	0.73	0.72	0.71	0.70	0.81	-
MnO	0.11	0.12	0.15	0.15	0.10	-
Sum	99.5	99.7	99.7	99.5	99.5	-
S.G.	2.457	2.455	2.473	2.446	2.455	2.456
R.I.	1.515	1.515	1.520	1.513	1.515	1.515
mass (g)	5.34	3.30	5.28	1.70	2.20	0.17



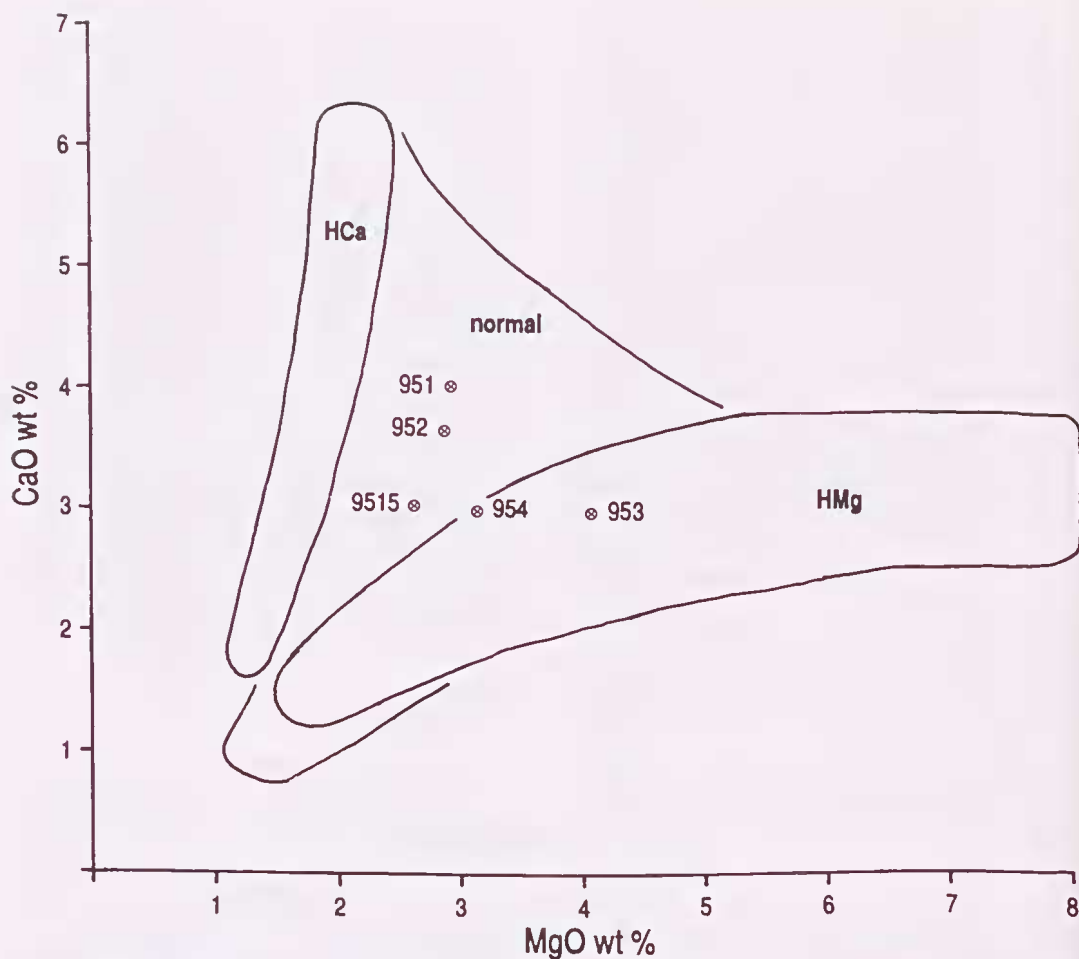


Fig. 2. Bivariate plot of CaO against MgO, showing the Tanami samples in relation to the compositional fields of HMg, HCa and 'normal' australites. (After Chapman and Schreiber 1969: fig. 2).

A criterion suggested by Cleverly (1976: 233) as a 'reliable' indicator of the extent of the strewn field is: '... multiple ( $\geq 10$ ) tangible specimens with flakes constituting a small minority...'. The specimens reported here are isolated finds, with only two having been found in proximity. Only the Western Australian specimen was found within an artefact scatter. One of the Tanami specimens is itself an artefact, but the remainder were not obviously associated with artefacts or other tangible evidence of human activity. The relatively small range of chemical variation within the sample (in spite of the tektites falling into two compositional classes) and the nature of the occurrences warrants their provisional use as strewn field indicators.

The two intact Bullock Head Lake specimens (953, 954) were found at the end of a more

extensive search on Tanami Downs, on a lateritic pebble surface that may represent an ancient land surface exhumed quite recently (geologically speaking) by dune retreat (Fig. 3). The surface may be an exposure of a laterite mapped as T1 on the 1:250,000 geological sheet of the area (SF 52-3, The Granites). T1 is extensive around Bullock Head, and further searching of it is warranted to establish whether tektites occur on it with sufficient frequency, as William Laurie's communication to Jensen (1915) might suggest, to provide a more 'reliable' sample with which to test our findings. Members of the Tanami Downs Aboriginal community are familiar with tektites, which were referred to as 'black gold', but they have not found any in that part of country, though they keep an eye out for them when they are out hunting.



B



Fig. 3. A, specimen 954 (centre) and the artefact AA95.9 (lower right quadrant) replaced (i.e. not *in situ*) on the lateritic pebble surface at Bullock Head Lake on which they were found, some 50 m apart. B, find site of 953 (foreground), near Bullock Head Lake. The flat ground possibly represents an ancient land surface exhumed by deflation of the sand dune in the background.

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